

High Mobility Heterojunction Complementary Field Effect Transistors and Methods Thereof

ABSTRACT OF THE INVENTION

5 A structure, and method of fabrication, for high performance field effect devices
is disclosed. The MOS structures include a crystalline Si body of one conductivity type, a
strained SiGe layer epitaxially grown on the Si body serving as a buried channel for
holes, a Si layer epitaxially grown on the SiGe layer serving as a surface channel for
electrons, and a source and a drain containing an epitaxially deposited, strained SiGe of
10 opposing conductivity type than the Si body. The SiGe source/drain forms a
heterojunction and a metallurgical junction with the Si body that coincide with each other
with a tolerance of less than about 10nm, and preferably less than about 5nm. The
heterostructure source/drain is instrumental in reducing short channel effects. These
structures are especially advantageous for PMOS due to increased hole mobility in the
15 compressively strained SiGe channel. Representative embodiments include CMOS
structures on bulk and on SOI.